

Serial No. 10/804,721
Amdt. Dated May 31, 2007
Reply to Office action of March 22, 2007

RECEIVED
CENTRAL FAX CENTER
MAY 31 2007

Amendments to the Claims:

Listing of Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (original). A method for steering an agricultural vehicle comprising:
receiving global positioning system (GPS) data including position and velocity information corresponding to at least one of a position, velocity, and course of said vehicle;
receiving a yaw rate signal corresponding to a yaw rate of said vehicle;
computing a compensated heading for said vehicle based on an integration of said yaw rate signal, said compensated heading comprising a blend of said yaw rate signal with heading information based on said GPS data, wherein said compensated heading is further dynamically calibrated based on said GPS data;

for each desired swath comprising a plurality of desired positions and desired headings:

computing an actual track and a cross track error from said desired swath based on said compensated heading and said position, wherein said position is compared with a selected desired position of said plurality of desired positions and said compensated heading is compared with a selected desired heading of said plurality of desired headings;

calculating a desired radius of curvature to arrive at said desired track with a desired heading;

generating a steering command based on said desired radius of curvature to a steering mechanism, said steering mechanism configured to direct said

Serial No. 10/804,721
Amdt. Dated May 31, 2007
Reply to Office action of March 22, 2007

vehicle.

Claim 2 (original). The method of Claim 1, further including receiving differential corrections for said GPS data and correcting said GPS data based on said differential corrections.

Claim 3 (original). The method of Claim 2, wherein said GPS data includes at least one of, carrier phase RTK corrections, a satellite based differential corrections, and ground based differential corrections.

Claim 4 (original). The method of Claim 2, further including utilizing a DGPS system with dual antennae optimized to generate additional accuracy in said GPS data, further including heading data and generating said compensated heading utilizing said GPS data and said heading data.

Claim 5 (original). The method of Claim 1, further including generating a differential corrector with a reference DGPS receiver and transmitting said differential corrector to the vehicle.

Claim 6 (original). The method of Claim 1, wherein said dynamic calibration includes at least one of rate gyro bias error and scale factor error, during operation, and eliminates static initialization.

Serial No. 10/804,721
Amdt. Dated May 31, 2007
Reply to Office action of March 22, 2007

Claim 7 (original). The method of Claim 1, further including generating a tilt angle for said vehicle based on at least one of a filtered accelerometer signal and roll signal which can be used to generate a cross track correction based on antenna rotation height to correct for slope induced error in said cross track error.

Claim 8 (original). The method of Claim 1, further including reducing error in an along track velocity and position by rotating an east and north velocity from said GPS data into along track and cross track components using said compensated heading.

Claim 9 (original). The method of Claim 1, where in said calculating includes generating radius of curvature data, based on best fit algorithms from said GPS data including a current position, a heading and a speed to a desired aim point and desired heading, said aim point can be at least one of: on a straight line with parallel guidance; an interpolated point from a point of closest approach to a previously logged, stored or generated curved track; an edge of previously traveled swaths; a data file of track points based on best fit algorithms.

Claim 10 (original). The method of Claim 1, wherein said generating a steering command includes generating a command to drive a hydraulic or electrically driven steering system of said vehicle based on a difference between said desired curvature to reach an aim point, a current speed of said vehicle and a rate of turn of said vehicle.

Serial No. 10/804,721
Amdt. Dated May 31, 2007
Reply to Office action of March 22, 2007

Claim 11 (original). The method of Claim 1, further including offsetting said desired line to match differences in spacing of existing tracks to compensate for spacing errors therein.

Claim 12 (original). The method of Claim 1, further including compensating for features in fields with a step in a nominal spacing of parallel guidance lines by offsetting said desired line to align with a current position.

Claim 13 (canceled).

Claim 14 (original). The method of Claim 1, further including real time determination of slope at a current position and application of a swath width adjustment to optimize real ground coverage to yield correct spacing between swaths and additional ground coverage.

Claim 15 (canceled).

Claim 16 (canceled).

Claim 17 (original). The method of Claim 1 whercin said blend includes combination of said yaw rate signal with said heading information, said yaw rate signal exhibiting high short term accuracy relative to said heading information, while said heading information exhibits high long term accuracy relative to said yaw rate signal.

Serial No. 10/804,721
Amtd. Dated May 31, 2007
Reply to Office action of March 22, 2007

Claim 18 (original). The method of Claim 16 wherein said blend employs Kalman filtering techniques.

Claim 19 (original). A system for steering an agricultural vehicle comprising:
a means for receiving global positioning system (GPS) data including position and velocity information corresponding to at least one of a position, velocity, and course of said vehicle;

a means for receiving a yaw rate signal corresponding to a yaw rate of said vehicle;

a means for computing a compensated heading for said vehicle based on an integration of said yaw rate signal, said compensated heading comprising a blend of said yaw rate signal with heading information based on said GPS data, wherein said compensated heading is further dynamically calibrated based on said GPS data;

for each desired swath comprising a plurality of desired positions and desired headings:

a means for computing an actual track and a cross track error from said desired swath based on said compensated heading and said position, wherein said position is compared with a selected desired position of said plurality of desired positions and said compensated heading is compared with a selected desired heading of said plurality of desired headings;

a means for calculating a desired radius of curvature to arrive at said desired track with a desired heading;

Serial No. 10/804,721
Amdt. Dated May 31, 2007
Reply to Office action of March 22, 2007

a means for generating a steering command based on said desired radius of curvature to a steering mechanism, said steering mechanism configured to direct said vehicle.

Claim 20 (original). A storage medium encoded with a machine-readable computer program code, wherein said storage medium includes instructions for causing a computer to implement a method for steering an agricultural vehicle comprising:

receiving global positioning system (GPS) data including position and velocity information corresponding to at least one of a position, velocity, and course of said vehicle;

receiving a yaw rate signal corresponding to a yaw rate of said vehicle;

computing a compensated heading for said vehicle based on an integration of said yaw rate signal, said compensated heading comprising a blend of said yaw rate signal with heading information based on said GPS data, wherein said compensated heading is further dynamically calibrated based on said GPS data;

for each desired swath comprising a plurality of desired positions and desired headings:

computing an actual track and a cross track error from said desired swath based on said compensated heading and said position, wherein said position is compared with a selected desired position of said plurality of desired positions and said compensated heading is compared with a selected desired heading of said plurality of desired headings;

calculating a desired radius of curvature to arrive at said desired track with a desired heading;

generating a steering command based on said desired radius of curvature to a steering mechanism, said steering mechanism configured to direct said vehicle.

Serial No. 10/804,721
Amdt. Dated May 31, 2007
Reply to Office action of March 22, 2007

Claim 21 (currently amended). A computer system producing a data signal
embodied in a computer readable medium:

wherein said computer data signal comprises code configured to cause a computer
to implement a method for steering an agricultural vehicle comprising:

receiving global positioning system (GPS) data including position and velocity
information corresponding to at least one of a position, velocity, and course of said vehicle;

receiving a yaw rate signal corresponding to a yaw rate of said vehicle;

computing a compensated heading for said vehicle based on an integration of said
yaw rate signal, said compensated heading comprising a blend of said yaw rate signal with
heading information based on said GPS data, wherein said compensated heading is further
dynamically calibrated based on said GPS data;

for each desired swath comprising a plurality of desired positions and desired
headings:

computing an actual track and a cross track error from said desired swath
based on said compensated heading and said position, wherein said position is compared with a
selected desired position of said plurality of desired positions and said compensated heading is
compared with a selected desired heading of said plurality of desired headings;

calculating a desired radius of curvature to arrive at said desired track with
a desired heading;

generating a steering command based on said desired radius of curvature
to a steering mechanism, said steering mechanism configured to direct said vehicle.